

**REMARKS**

None of the claims have been amended or cancelled. Claims 1, 2, 4, 5, 7 and 11-13 are pending. Claims 1, 11, 12 and 13 are the independent claims. No new matter is presented in this Response.

**REJECTIONS UNDER 35 U.S.C. §102:**

Claims 1-2, 5, 7, and 11-12 are rejected under 35 U.S.C. §102(b) as being anticipated by Mitnaga et al. (U.S. Patent No. 5,923,997).

Regarding the rejection of independent claim 1, it is noted that claim 1 recites a display device with a polysilicon substrate, comprising amongst other novel features, a display region; a driving region; primary crystal grain boundaries in the polysilicon substrate in the display region and in the driving region; secondary crystal grain boundaries in the polysilicon substrate in the display region and in the driving region; wherein the primary crystal grain boundaries are located within the gate regions of the first plurality of thin film transistors and are inclined to a first direction of current flowing from source to drain of each of the first plurality of thin film transistors in the display region at an angle of  $-30^{\circ}$  to  $30^{\circ}$  and the secondary crystal grain boundaries are located within the gate regions of the first plurality of thin film transistors and are inclined to a second direction of current flowing from source to drain of each of the first plurality of thin film transistors in the display region, and wherein the primary crystal grain boundaries are located within the gate regions of the second plurality of thin film transistors and are inclined to the second direction of current flowing from source to drain of each of the second plurality of thin film transistors in the driving region at an angle of  $30^{\circ}$  to  $150^{\circ}$  and the secondary crystal grain boundaries are located within the gate regions of the second plurality of thin film transistors and are inclined to the first direction of the current flowing from source to drain of each of the second plurality of thin film transistors in the driving region.

Mitnaga discloses forming an active region of a semiconductor device in a portion of the crystallized semiconductor layer, such that a relationship between crystal growth direction and electric current direction of the device is selected in accordance with a desired mobility of the active region (abstract). To do so, Mitnaga discloses that a small amount of the low melting point metal or catalytic metal is added to a region which should come into the TFT used for the pixel so that a crystal grows in the lateral direction, and as a result, a large number of grain boundaries are formed in the channel direction thereby lowering the OFF-state current (column

8, lines 1-6). Mitnaga further discloses that the TFT forming the driver for the peripheral circuit requires a high mobility, and therefore a small amount of low melting metal or catalytic metal is added in the region close to the TFT forming the driver for the peripheral circuit and a crystal is allowed to grow in one direction from the metal added portion. The direction of the crystal growth coincides with the path direction of electric current in the channel (column 8, lines 7-16).

Finally Mitnaga discloses in Figs. 5B and 5C the relationship between crystal growth direction and source-drain direction along which the channel current flows as well as the silicon crystals extending laterally in one direction and the grain boundaries between the crystals (column 14, lines 60-67).

Accordingly, although Mitnaga discloses a relationship between crystal growth and current flow direction, Mitnaga does not teach or suggest two distinct types of grain boundaries. i.e., a primary grain boundary and secondary grain boundary. As a matter of fact, Mitnaga appears to teach only one type of crystal grain boundary. As illustrated in Figs. 5B and 5C, Mitnaga discloses crystals extending laterally 215 in one direction and grain boundaries 216 located between the crystals (column 14, lines 60-67 and column 15, lines 1-23). In other words, the grain boundaries 216 are simply one type of crystal grain boundary. Furthermore, it is noted that the reason for forming only one type of grain is that Mitnaga uses a different method from the one of the present invention (column 2, lines 34-38). For example, Mitnaga teaches using the CVD method whereas an aspect of the present invention uses an SLS method.

Accordingly, Applicants respectfully assert that the rejection of claim 1 under 35 U.S.C. § 102(b) should be withdrawn because Mitnaga fails to teach or suggest each feature of independent claim 1.

Regarding the rejection of independent claims 11 and 12, it is noted that these claims recite some substantially similar features as claim 1. Thus, the rejections of these claims are also traversed for substantially the same reasons set forth above.

Furthermore, Applicants respectfully assert that the rejection of dependent claims 2, 5 and 7 under 35 U.S.C. §102(b) should be withdrawn at least because of their dependency from claim 1 and the reasons set forth above, and because the dependent claims include additional features which are not taught or suggested by the prior art. For example, claim 5 recites that the polysilicon substrate is fabricated by an SLS (sequential lateral solicitation) method, whereas Mitnaga teaches a CVD method. Furthermore, although the Office Action states that this claim is a product-by-process claim, it is noted that even assuming *arguendo* that claim 5 were a

"product-by-process" claim, MPEP 2113 states that "[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). The structure implied by the process steps should be considered when assessing the patentability of product-by-process claims over the prior art, especially where the product can only be defined by the process steps by which the product is made, or where the manufacturing process steps would be expected to impart distinctive structural characteristics to the final product. See, e.g., *In re Garnero*, 412 F.2d 276, 279, 162 USPQ 221, 223 (CCPA 1979) (holding "interbonded by interfusion" to limit structure of the claimed composite and noting that terms such as "welded," "intermixed," "ground in place," "press fitted," and "etched" are capable of construction as structural limitations.).

In the instant case, the structure implied by the SLS method recited in claim 5 is clearly distinct from a structure implied by the CVD method taught by Mitnaga. Accordingly, patentable weight must be given to the method used for forming the primary and secondary crystal grain boundaries since the structure implied by the process steps should be considered when assessing the patentability of product-by-process claims over the prior art, as noted in MPEP 2113.

Therefore, it is respectfully submitted that claims 2, 5 and 7 also distinguish over the prior art.

#### **REJECTIONS UNDER 35 U.S.C. §103:**

Claim 4 is rejected under 35 U.S.C. §103(a) as being unpatentable over Mitnaga et al. (U.S. Patent No. 5,923,997).

Initially it is noted that claim 4 depends from claim 1 and as noted above, Mitnaga fails to teach or suggest the novel features of independent claim 1.

Accordingly, Applicants respectfully assert that the rejection of dependent claim 4 under 35 U.S.C. §103(a) should be withdrawn at least because of its dependency from claim 1, and because the dependent claim includes additional features which are not taught or suggested by the prior art. Therefore, it is respectfully submitted that claim 4 also distinguishes over the prior art.

**CONCLUSION:**

There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 503333.

Respectfully submitted,

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